Evaluating ladder fuels across multiple spatial scales for improved fire modeling

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Introduction

A relative ladder fuel cover metric derived from airborne LiDAR (Kramer et al. 2016) strongly correlates with crown mortality in Sonoma County following recent wildfires (Tukman et al. *in review*).

Issues related to this metric:

1) It has not been ground-truthed.
2) It is unknown if this metric, derived from airborne LiDAR (ALS), can also be derived from terrestrial LiDAR (TLS).
3) It is unknown if this metric (representing pre-fire ladder fuels) is related to post-fire ladder fuels.
4) It has not yet been related to canopy base height, thus making it unable for direct use in current predictive fire models.

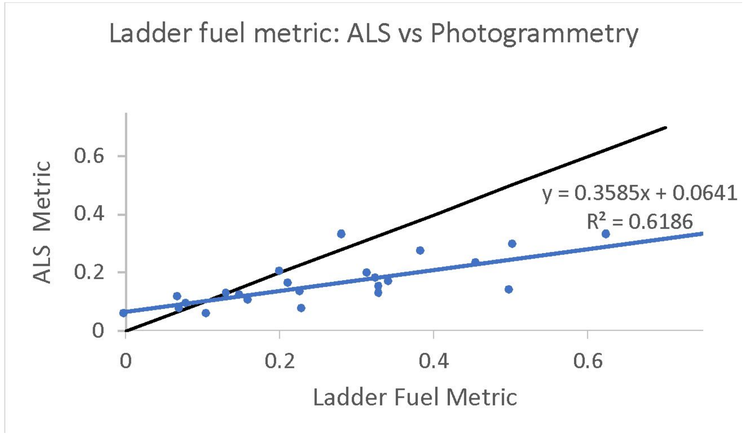
Research Objectives

1) Measure ladder fuels using a ground-based photographic method (Kramer et al. 2016) and compare to the ALS-derived relative ladder fuel cover metric.
2) Measure ladder fuels using TLS and compare TLS estimates o the ALS-derived relative ladder fuel cover metric.
3) Quantify the amount of ladder fuels both pre- and post-fire using TLS and then compare these data to the ALS-derived relative ladder fuel cover metric.
4) Relate the relative ladder fuel cover metric (calculated via photos, ALS and TLS) to canopy base height (calculated via ground measurements and TLS).

Methods

- Ladder fuels and CBH data collected at Pepperwood Preserve
  - 24 plots pre Kincade fire
  - 17 plots post Kincade fire
- Vinyl banner (4m) was used for ground-based photography of ladder fuels (analysis via Image-J)
- CBH was estimated by measuring crown base height for all trees in the plots with a laser range finder.
- TLS data were collected with a Riegl VZ-400i LiDAR scanner and processed via RiSCAN Pro and Lidar360.

Preliminary Results



The ALS-derived relative ladder fuel cover metric is related to ladder fuels measured by ground-based photography.

Next steps

Work with TLS data to extract ladder fuels estimates.